Wildlife and Highway Management

Lesson 1: Is There a Problem with Wildlife on Our Roads?

LESSON OVERVIEW

Students must determine whether or not wildlife-vehicle collisions are a legitimate problem on which to spend money. They will be divided into small groups and given some data regarding this situation. Each group must analyze and present their data to the class. Then, each student will independently reach a conclusion and write a brief essay supporting it.

SUGGESTED GRADE LEVELS

7 − 12

ENDURING UNDERSTANDINGS

- Scientists often work in teams to solve problems.
- Accurate and reliable data need to be analyzed impartially to develop conclusions.

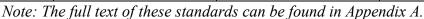
OBJECTIVES

Students will:

- Make a graph to represent numerical information.
- Analyze graphs to come to a conclusion.
- Write an essay in which their conclusions are supported by facts.

ARIZONA DEPARTMENT OF EDUCATION STANDARDS

Grade	Science	Mathematics	Writing
7	S1-C3-01; S1-C3-05;	S2-C1-04; S2-C1-05;	S2-C1-01; S2-C1-03;
	S1-C4-05; S3-C1-03;	S2-C1-07; S2-C1-08;	S2-C1-04; S2-C2-03;
	S3-C1-04; S3-C2-01;	S2-C1-09	S2-C2-05; S2-C3-02;
	S4-C3-04		S2-C3-04; S2-C4-01;
8	S1-C3-01; S1-C3-05;	S2-C1-07; S2-C1-08	S2-C4-03; S2-C5-02;
	S1-C4-01; S1-C4-03;		S3-C4-01
	S1-C4-05; S3-C1-01;		
	S3-C2-01		
High School	S1-C1-01; S1-C4-01;	S2-C1-08; S2-C1-09	S2-C1-03; S2-C1-05;
	S1-C4-02; S1-C4-03;		S2-C2-03; S2-C2-05;
	S1-C4-04; S3-C1-01;		S2-C3-02; S2-C3-03;
	S3-C1-03; S3-C1-04;		S2-C4-01; S2-C4-02;
	S3-C2-03		S2-C4-03; S2-C5-03;
			S3-C4-01





• Two days (45 minutes each day)



MATERIALS

- Wildlife-Vehicle Collision Data Analysis worksheets (one per group)
- Butcher paper (one per group)
- Markers
- Rulers
- *Is There a Problem? Rubric* (one per student)

TEACHER PREPARATION

- Make copies of the *Wildlife-Vehicle Collision Data Analysis* worksheets. Please note that there are six versions of this worksheet. Each group should get a different version. You might also want to make enough copies for each group member to have one.
- Make copies of the *Is There a Problem? Rubric* for each student.
- Gather enough materials for six groups.

SUGGESTED PROCEDURES

- 1. Divide the class into six groups of equal size. Number the groups, 1 through 6.
- 2. Hand out the Wildlife-Vehicle Collision Data Analysis worksheets.
- 3. As a class, read the information presented in the first three paragraphs. This will give the students a basic idea of what to expect.
- 4. Inform them that each group will be looking at the data concerning one small aspect of this whole situation. Each group must become experts on their part of the problem. After analyzing their data, they will be presenting the information to the class. Emphasize that they must pay attention to all of the presentations because they will use all of the information presented to determine what should be done, if anything, to prevent wildlife-vehicle collisions.
- 5. Let the groups work. Allow enough time for them to look at the data, graph it, and prepare their presentations. This will probably take the remainder of Day 1.
- 6. Ask each group in numerical order to make their presentation. Advise the students that they should take notes about important parts because they will be writing an essay on what they think should be done.
- 7. When all groups have presented, inform the students that they will now be working independently. Each student will write a brief essay summarizing the information that was presented by each group and coming to their own conclusion. They must first decide if there is a problem with wildlife-vehicle collisions, and, if so, what types of management measures can be used to control or prevent them. At this point, each student should be working independently. Hand out the rubric so that each student knows how the paper will be graded. Students who do not finish in the allotted class time may work on the essay as a homework assignment.

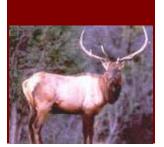


- Group presentations
- Individual essay



EXTENSIONS

• Have the students construct a graph using Excel and prepare their presentations using PowerPoint.

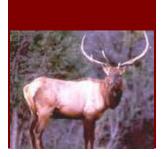




Appendix A: Arizona Department of Education Standards - Full Text

Science Standards

Grade	Standards Strand	Concept	Performance Objective
7	1	3 – Analysis and	1 – Analyze data obtained in a scientific
		Conclusions	investigation to identify trends
			5 – Formulate a conclusion based on
			data analysis
		4 – Communication	5 – Communicate the results and
			conclusion of the investigation
	3	1 – Changes in	3 – Propose possible solutions to
		Environment	address the environmental risks in
			biological or geological systems
			4 – Analyze the environmental risks
			caused by human interaction with
			biological or geological systems
		2 – Science and	1 – Propose viable methods of
		Technology in	responding to an identified need or
		Society	problem
	4	3 – Populations of	4 – Evaluate data related to problems
		Organisms in an	associated with population growth and
		Ecosystem	the possible solutions
8	1	3 – Analysis and	1 – Analyze data obtained in a scientific
		Conclusions	investigation to identify trends
			5 – Explain how evidence supports the
			validity and reliability of a conclusion
		4 – Communication	1 – Communicate the results of an
			investigation
			3 – Present analyses and conclusions in
			clear, concise formats
			5 – Communicate the results and
			conclusions of the investigation
	3	1 – Changes in	1 – Analyze the risk factors associated
		Environment	with natural, human induced, and/or
			biological hazards
		2 – Science and	1 – Propose viable methods of
		Technology in	responding to an identified need or
		Society	problem



Science Standards Continued

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Grade	Strand	Concept	Performance Objective	
High	1	1 – Observations,	1 – Evaluate scientific information for	
School		Questions, and	relevance to a given problem	
		Hypotheses		
		4 – Communication	1 – For a specific investigation, choose	
			an appropriate method for	
			communicating the results	
			2 – Produce graphs that communicate	
			data	
			3 – Communicate the results clearly and	
			logically	
			4 – Support conclusions with logical	
			scientific arguments	
	3	1 – Changes in	1 – Evaluate how the processes of	
		Environment	natural ecosystems affect, and are	
			affected by, humans	
			3 – Assess how human activities can	
			affect the potential for hazards	
			4 – Evaluate how urban development	
			affects the quality of the environment	
		2 – Science and	3 – Support a position on a science or	
		Technology in	technology issue	
		Society		

Mathematics Standards

Grade	Strand	Concept	Performance Objective
7	2	1 – Data	4 – Interpret data displays including
		Analysis	histograms, stem-and-leaf plots, circle
		(Statistics)	graphs, and double line graphs
			5 – Answer questions based on data
			displays including histograms, stem-and-
			leaf plots, circle graphs, and double line
			graphs
			7 – Interpret trends from displayed data
			8 – Compare trends in data related to the
			same investigation
			9 – Solve contextual problems using
			histograms, line graphs or continuous data,
			double bar graphs, and stem-and-leaf plots
8	2	1 – Data	7 – Formulate reasonable predictions based
		Analysis	on a given set of data
		(Statistics)	8 – Compare trends in data related to the
			same investigation
High	2	1 – Data	8 – Make reasonable predictions for a set of
School		Analysis	data, based on patterns
		(Statistics)	9 – Draw inferences from charts, tables,
			graphs, plots, or data sets



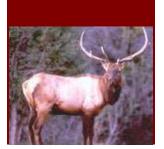
Writing Standards

	Standards		D 6 City
Grade	Strand	Concept	Performance Objective
7 - 8	2	1 – Ideas and	1 – Use clear, focused ideas and details to
		Content	support the topic
			3 – Develop a sufficient explanation or
			exploration of the topic
			4 – Include ideas and details that show
			original perspective
		2 -	3 – Place details appropriately to support
		Organization	the main idea
			5 – Construct paragraphs by arranging
			sentences with an organizing principle (e.g.,
		2 17 :	to develop a topic, to indicate a chronology)
		3 – Voice	2 – Convey a sense of identity through
			originality, sincerity, liveliness, or humor
			appropriate to the topic and type of writing
			4 – Choose appropriate voice (e.g., formal,
			informal, academic discourse) for the
		4 337 1	audience and purpose
		4 – Word	1 – Use accurate, specific, powerful words
		Choice	that effectively convey the intended
			message
			3 – Use vocabulary that is original, varied,
		5 G 1	and natural
		5 – Sentence	2 – Create sentences that flow together and
		Fluency	sound natural when read aloud
	3	4 – Persuasive	1 – Write persuasive text that: a) establishes
			and develops a controlling idea, b) supports
			arguments with detailed evidence, c)
			includes persuasive techniques, and d)
***			excludes relevant information
High	2	1 – Ideas and	3 – Provide sufficient, relevant and
School		Content	carefully selected details for support
			5 – Include ideas and details that show
			original perspective and insights
		2-	3 – Place details appropriately to support
		Organization	the main idea
			5 – Employ a variety of paragraphing
			strategies (e.g., topical, chronological,
			spatial) appropriate to application and
		2 17-:	purpose
		3 – Voice	2 – Convey a sense of identity through
			originality, sincerity, liveliness, or humor
			appropriate to the topic and type of writing
			3 – Choose appropriate voice (e.g., formal,
			informal, academic discourse) for the
			application



Writing Standards Continued

writing	Writing Standards Continued			
Grade	Strand	Concept	Performance Objective	
High	2	4 – Word	1 – Use accurate, specific, powerful words	
School		Choice	and phrases that effectively convey the	
			intended message	
			2 – Use vocabulary that is original, varied,	
			and natural	
			3 – Use words that evoke clear images	
		5 – Sentence	3 – Demonstrate a flow that is natural and	
		Fluency	powerful when read aloud	
	3	4 – Persuasive	1 – Write a persuasive composition that: a)	
			states a position or claim, b) presents	
			detailed evidence, examples, and reasoning	
			to support effective arguments and	
			emotional appeals, c) attributes sources of	
			information when appropriate, d) structures	
			ideas, and e) addresses the reader's	
			concerns (grades $9 - 10$) or acknowledges	
			and refutes opposing arguments (grades 11	
			– 12)	



Appendix B: Worksheets and Overheads

The pages that follow contain the worksheets listed below:

- A. Wildlife-Vehicle Collision Data Analysis Six different worksheets that present relevant information (6 pages)
- B. *Is There a Problem? Rubric* One method to evaluate student writing (1 page)

